CONSTRUCTION STANDARD SPECIFICATION

SECTION 13852

INTELLIGENT FIRE ALARM SYSTEM

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PART 1 -GENERAL

1.01 SUMMARY

A. Design/build, install, test and place into service a complete addressable intelligent fire alarm system per the requirements of this Section and NFPA 72. The system shall be complete including a control panel, alarm initiating devices, notification appliances, and accessory equipment necessary for a complete system.

B. The fire alarm control panel (FACP) will transmit signals via a Digital Alarm Communicator Transmitter (DACT) to Sandia's Proprietary Supervising Station, hereafter referred to as Central Station. The communication format for the DACT shall be Ademco Contact ID. Two dedicated phone lines, provided by Sandia, will be utilized for the DACT communications to the Central Station.

C. This Section includes the requirements for modifications made to existing intelligent fire alarm systems.

1.02 REFERENCES

A. The current editions of the following standards are part of this Section:

1. NFPA 70 - National Electrical Code
2. NFPA 72 - National Fire Alarm Code
3. NFPA 90A - Installation of Air-Conditioning and Ventilating Systems
4. International Fire Code
5. International Building Code
6. Sandia National Laboratories – NM Facilities CADD Standards Manual

B. Related Construction Standard Specifications

1. Division 1, Section 01330, "Submittal Procedures".

2. Division 7, Section 07270, "Firestop and Smokestop Systems".

3. Division 9, Section 09900, "Painting".

4. Division 16, Section 16001, "Electrical Work".

C. Related Standard Drawings:

1. E-0006STD, "Standard Symbols List & General Notes".

2. FA5003STD, "Installation Details".

3. FA7001STD, "Fire Alarm Wiring Diagrams".

4. FA7002STD, "Notification Appliance Wiring Diagrams".

D. Conflicts between the references and this Section shall be referred to the Sandia Delegated Representative (SDR) who will determine which standard shall govern.

1.03 SUBMITTALS

A. Equipment Data Sheets:

1. Equipment data sheets shall be submitted for all equipment and devices used in the fire alarm system. If options are listed on the data sheets, the specific option for the project shall be clearly marked. The equipment submittals shall include but not be limited to the following:

a. Fire alarm control panel and components.

b. Batteries and enclosures.

d. Notification appliances, including NAC power supplies.

e. Initiating devices.

f. Addressable modules, including isolating modules.

g. Filters or surge suppression devices.

h. Annunciators.

B. Shop Drawings:

1. SNL Facilities Management and Operations Center utilizes MicroStation J for Windows/NT as its standard CADD software. If MicroStation J is not utilized, use AutoCad 2000 or later version. Refer to Part 4 in this Section for description of CADD software submittal requirements.

2. For drawings prepared and reviewed by a NICET certified designer, provide copies of the NICET certificates with the drawings submitted for approval. For drawings prepared and reviewed by a registered professional Fire Protection Engineer, the drawings shall be stamped with the engineer's stamp.

3. Floor Plans: Provide the following information on fire alarm floor plans:

   a. All fire alarm component equipment and device locations, including location of addressable modules.

   b. On final as-built drawings indicate SLC address for all devices and addressable modules (e.g., D15, M9). If there is more than one SLC, indicate loop number with address (e.g., L2D15, L1M4).

   c. Location of notification appliance power supplies with identification label (e.g., PS-1, PS-2, etc.).

   d. Indicate NAC zone number for all notification appliances (e.g., Z-1, Z5, PS1-3, PS2-1).

   e. Show routing of conduit and J-boxes to be installed.

   f. Show location and identification of power panels with connected fire alarm system load. Indicate branch circuit number(s) utilized by fire alarm equipment.

4. System Riser Wiring Diagram: Provide the following information on the riser wiring diagram drawing:

   a. Each FACP, annunciator, device, and addressable module. On final as-built drawings indicate the SLC address for each device and module.

   b. All notification appliances with zone number.

   c. Locate all initiation devices and notification appliances on the riser diagram to reflect the general location in the building by floor, building section/wing, etc.

   d. Notification appliance power supplies.

   e. Conduit sizes.

   f. Cable and wire types and sizes.

   g. Device-to-device schematic wiring diagram.

h. All addressable modules and the devices/equipment they are monitoring or controlling (e.g., flow switches, tamper switches, release panels, HVAC fans, dampers, elevator recall).

i. The 120 Vac panel and circuit number for each fire alarm power circuit.

5. System Operation Description: Provide an input/output matrix describing the sequence of operations for each type of circuit for manually and automatically initiated system inputs and outputs. Refer to Appendix A in NFPA 72 for sample of an input/output matrix.

6. Device Address List: After commissioning fire alarm system, provide device/module address list (8½ x 11") for all devices connected to or controlled by the FACP. The device list shall include the following information:

a. Device type.

b. Device address.

c. Descriptor of device location and/or function.

d. For control and relay addressable modules, list descriptor of operation the module will perform.

7. Calculations:

a. Batteries: Battery size calculations to provide 24 hours supervisory, 5 minutes alarm secondary backup power.

b. NAC Calculations: Load and voltage drop calculations for each NAC.

C. Qualification Data:

1. Fire Alarm Installer: For each installer, provide documentation verifying compliance with one of the requirements listed below.

a. Minimum NICET Fire Alarm Level II certification.

b. Fire alarm equipment manufacturer training certification for the fire alarm system equipment being installed.

2. Fire Alarm Designer: Provide documentation verifying compliance with one of the requirements listed below.

a. Minimum NICET Fire Alarm Level III certification.

b. Registered Professional Fire Protection Engineer in the State of New Mexico.

D. Operation and Maintenance Data: For new building fire alarm system installations provide complete operation, installation, and maintenance manual for the fire alarm

system components installed. Comply with the 1999 NFPA 72 Appendix A Section A-1-6.2.2(1) recommendations for Owner's manual.

E. Submittals to SNL Fire Protection Engineering: In addition to distribution requirements for submittals specified in Division 1 Section 01330, "Submittal Procedures", make an identical submittal to the designated Sandia Fire Protection Engineer for approval. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. Approval of submittal by the FPE is required prior to proceeding with the installation of the fire alarm system.

F. Contract Closure Documentation:

1. Record of Completion: Provide to the SNL FPE the "Record of Completion" for the completed system according to NFPA 72 prior to the system acceptance test.

2. Final Test Records: Submit a report of the final acceptance tests according to the requirements in NFPA 72 and submit to the SNL FPE.

3. FACP Report: Submit reports (both hardcopy and electronic media) for the FACP configuration and programming to the SNL FPE after completion of the system acceptance test.

4. As-Built Drawings: Provide 2 hard copies (for Maintenance and SNL FPE records) and the electronic media of the as-built fire alarm floor plans, wiring diagrams, input/output operational matrix, and device address list to the SNL FPE.

5. Upon completion of fire alarm system installation or modification, provide both a hard copy and the electronic media of the as-built drawings to the Sandia CADD Coordinator for incorporation into the SNL Document Management System.

6. NAC Decibel Test Results: Note the NAC decibel values for each room in the building on floor plans and deliver to the SNL FPE prior to the system acceptance test for verification that proper NAC decibel levels are achieved for evacuation of building occupants.

1.04 QUALITY ASSURANCE

A. Designer Qualifications: The designer of the fire alarm system shall meet one of the requirements listed below.

1. Certified, as a minimum, NICET Fire Alarm Level III.

2. A registered professional Fire Protection Engineer in the State of New Mexico.

B. Installer Qualifications: Each installer of the fire alarm system shall meet one of the requirements listed below.

1. Certified, as a minimum, NICET Fire Alarm Level II.

2. Trained and certified by manufacturer as qualified to install fire alarm system components being installed for this Project.

C. Electrical Components, Devices, and Accessories:

1. All equipment and devices furnished shall be Factory Mutual (FM) approved or Underwriter Laboratories (UL) listed, unless specifically noted otherwise.

2. Approved or listed equipment shall be so noted in the latest edition of the FM Approval Guide or the UL Fire Protection Equipment Directory.

3. All initiating devices and addressable modules shall be UL listed for use with the FACP.

1.05 DEFINITIONS

A. DACR: Digital Alarm Communicator Receiver

B. DACT: Digital Alarm Communicator Transmitter

C. FACP: Fire Alarm Control Panel

D. FATC: Fire Alarm Terminal Cabinet

E. FPE: Fire Protection Engineer(ing)

F. IDC: Initiating Device Circuit

G. IDR: Intermediate Distribution Room (building red/black communication room)

H. NAC: Notification Appliance Circuit

I. NICET: National Institute for Certification of Engineering Technologies

J. SCO: Sandia Construction Observer

K. SLC: Signal Line Circuit

L. SNL: Sandia National Laboratories, Albuquerque, New Mexico

M. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.06 SYSTEM DESCRIPTION

A. Comply with NFPA 72 requirements.

B. The fire alarm control panel shall include the following capabilities:

1. Communicate with Sandia's Central Station DACR using a DACT with Ademco Contact ID communication format.

C. Field Wiring:

1. Signal Line Circuits (SLC) shall be wired as NFPA 72 Class A, Style 7.

2. Initiating Device Circuits (IDC) shall be wired as NFPA 72 Class A, Style D.

3. Notification Appliance Circuits (NAC) shall be wired as NFPA 72 Class B, Style Y.

D. Fire alarm signal initiation shall be by one or more of the following devices:

1. Manual pull stations.

2. Heat detectors.

3. Photoelectric smoke detectors.

4. Automatic sprinkler system water flow detection switches.

5. Automatic sprinkler system pressure switches.

6. Air sampling control panels.

7. Fire suppression release panels.

E. Fire alarm signal shall initiate the following actions:

1. Alarm notification appliances shall operate continuously.

2. Identify alarm at FACP and remote annunciators.

3. Transmit an alarm to the Sandia Central Station.

4. Unlock electric door locks in designated egress paths.

5. Recall of elevators.

6. Release fire doors held open by magnetic door holders.

7. Close fire/smoke dampers.

8. Switch HVAC equipment controls to fire alarm mode.

9. Actuate smoke removal equipment.

10. Activate power shunt-trip circuit breakers.

11. Record events in the FACP system memory.

F. Supervisory signal initiation shall be by one or more of the following devices:

1. Operation of a fire protection system valve tamper switch.

2. Alarm activation of the flow switch on the backflow preventer catastrophic failure drain pipe.

3. Alarm activation of low-pressure alarms on dry pipe automatic sprinkler systems.

4. Alarm activation of duct smoke detector.

G. Supervisory signal shall initiate the following actions:

1. Transmit a Supervisory alarm to the Sandia Central Station.

2. Record events in the FACP system memory.

H. System trouble signal initiation shall be by one or more of the following devices or actions:

1. Open circuits, shorts and grounds of wiring for initiation device, signaling line, and notification appliance circuits.

2. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.

3. Loss of primary power at the FACP (non-latching alarm with a programmed time delay prior to sending alarm to Central Station).

4. Ground or a single break in FACP internal circuits.

5. Abnormal ac voltage at the FACP.

6. A break in standby battery circuitry.

7. Failure of battery charging.

8. Abnormal position of any switch at the FACP or annunciator.

9. Failure of DACT to function properly.

10. Failure of phone lines connected to DACT.

11. Common input/output trouble, AC fail, low battery, and ground fault from the NAC power supply.

I. Notification Appliance Circuit: Operation shall sound a continuous bell tone, 1560 Hz modulated (0.07 sec. On/Repeat) or similar signal, and be capable of operating 6" and 10" polarized vibrating bells.

1.07 DESIGN CRITERIA

A. Fire Alarm Control Panel

1. Location: Install the FACP near the main building entrance in a location readily visible and accessible by emergency responders. Do not locate the FACP in locations exposed to temperature extremes.

2. AC Power: Provide a dedicated 120 VAC, 20-amp branch circuit from the nearest power panel for FACP power.

3. Telecommunications: Provide a CAT5 telephone cable (8-conductor) in a dedicated raceway from the FACP to the building IDR for the DACT primary and secondary phone numbers.

4. Provide a pull box or wire gutter in an accessible location in the ceiling above the FACP to minimize the number of conduit penetrations into the FACP. Refer to Standard Drawing FA5003STD for the installation detail.

B. Manual Pull Stations

1. Location: Provide manual pull stations at the following locations:

a. Each pedestrian exit door, including equipment rooms.

b. At doors leading to stairways on floors above and below the main floor.

c. In normal paths of exit in highly visible locations so the travel distance from any point in the building to a manual pull station does not exceed 200 feet.

C. Photoelectric Smoke Detectors

1. Location: Provide photoelectric smoke detectors at the following locations:

   a. In immediate vicinity of FACP.

   b. Inside IDR.

   c. In elevator lobbies, at top of elevator hoistways (unless protected by automatic sprinklers), and in elevator machine rooms to initiate elevator recall.

   d. In main electrical equipment rooms (not closets housing electrical panelboards).

   e. In areas not protected with an automatic sprinkler system.

   f. In locations required by applicable codes and standards (e.g., NFPA 75, NFPA 318).

D. Heat Detectors

1. Location: Provide heat detectors at the following locations:

   a. Within 2 feet of sprinkler head(s) in hoistways when elevator shutdown is required prior to sprinkler activation.

   b. In mechanical rooms without automatic sprinkler system protection.

   c. In locations required by applicable codes and standards.

E. Duct Photoelectric Smoke Detectors

1. Location: Provide duct photoelectric smoke detectors on supply and return HVAC ducts where required by NFPA 90A and NFPA 72.

2. Remote Test Station: Provide a remote test station for each duct smoke detector. Locate and group remote test station(s) in an equipment room or electrical closet near the duct smoke detector(s) location.

3. Utilize addressable relay modules to control HVAC equipment instead of the auxiliary contacts on the duct smoke detectors.

F. Automatic Sprinkler System Initiating Devices: Provide individual monitor modules for each water flow, pressure switch, or tamper supervisory switch installed on the automatic sprinkler protection system. Coordinate location of monitor modules with the contractor installing the automatic sprinkler system.

G. Ancillary Control Panels: Provide individual monitor modules for each ancillary control panels (e.g., fire suppression release panels, air-sampling control panels,

toxic gas detection panels, ADA area refuge phones, etc.) that requires connection to the fire alarm system for monitoring.

H. Isolator Modules: Provide isolator modules on the SLC every 20-25 devices and where the SLC enters another building floor or section to simplify troubleshooting the circuit.

I. Notification Appliances

1. Multitone Horns: Provide audible notification appliances throughout the building as required to achieve the decibel levels required by NFPA 72. The average and minimum decibel levels required for the various occupancies at SNL are listed below:

Occupancy	Avg. Ambient dBA	Minimum dBA Required
Office Areas	55	70
Assembly Areas	55	70
Storage Areas	55	70
Computer Rooms	70	85
Labs	70	85
Low and High Bays	70	85
Clean Rooms	70	85
Mechanical Rooms	90	105

2. Strobes: Provide visual notification appliances in all common areas (e.g., restrooms, conference rooms, break areas, corridors, hallways, stairways, lobbies), open areas with calculated occupant loads of 10 or more occupants, and in locations with a high ambient sound level (e.g., mechanical rooms).

3. Emergency Responder Appliance: At the main entrance(s) to the building, provide a weatherproof multitone horn/strobe appliance on the exterior wall of the building that is readily visible to emergency responders for indicating when the building fire alarm system is in an ALARM condition.

4. NAC Power Supplies: Provide NAC power supplies throughout the building, as required, to provide power for the audible/visual appliances and to reduce voltage drop on NACs. Provide a dedicated 120 VAC, 20-amp branch circuit from the nearest power panel to power the NAC power supply. Locate NAC power supplies in accessible locations for maintaining the panels, preferably in equipment chases and electrical closets or rooms.

5. Zoning: The boundaries of NAC zones shall coincide with building outer walls, building fire or smoke compartment boundaries, floor separations, or other fire safety subdivision. Initially load each NAC zone with appliances that do not exceed 80 percent of the available NAC amperage to permit later addition of appliances to the circuit.

J. Fire Safety Functions

1. Provide the following fire safety function controls as required by applicable codes and standards:

a. Elevator recall/shutdown

b. Fire door release

c. HVAC shutdown

d. Closure of fire/smoke dampers

e. Activation of smoke removal equipment

f. Activation of shunt-trip circuit breakers

1.08 PROGRAMMING

A. Each alarm point shall be programmed to report to the Central Station, using Contact ID, for alarm processing by the Central Station Operator. Restoral signals will not require alarm processing by the Central Station Operator.

B. Program a time delay for AC power loss alarm transmittal to the Central Station to prevent excessive alarm signal transmittals during a global power outage. Upon restoral of AC power, the FACP AC power loss alarm shall automatically reset.

C. Group all addressable alarm points that shutdown HVAC equipment (e.g., air handlers, fire/smoke dampers) onto one zone that is transmitted to the Central Station for notifying SNL maintenance personnel whenever the fire alarm system shuts down HVAC equipment.

1.09 PROJECT CONDITIONS

A. Interruption of Existing Fire Alarm Service: Do not interrupt operational fire alarm systems until the following conditions have been met:

1. Notify the SCO no fewer than two working days in advance of proposed interruption of fire alarm system.

2. Verify that the fire alarm system has been impaired (e.g., NAC on "OFF" position) prior to starting work to avoid evacuating building occupants.

3. Maintain existing fire alarm system in service during non-standard working hours and over weekends. If unable to do so, notify SCO.

1.10 SEQUENCING AND SCHEDULING

A. FPE Submittal Acceptance: Do not proceed with the fire alarm system installation until fire alarm submittals have been approved by Sandia Fire Protection Engineering.

B. Existing Fire Alarm Equipment: Maintain existing fire alarm equipment in service a long as possible while modifications to the fire alarm system is underway. Label manual pull stations "NOT IN SERVICE" when they are not operative. Post temporary signs ("ATTENTION – In Case of Fire Call 911") at building entryways and all stairwells when the fire alarm system is not operative or impaired in the building. Refer to Attachment A of this Section for sample sign that can be photocopied to use as notification of fire alarm system impairment.

C. DACT Phone Lines: Contact SCO no later than 14 days prior to final commissioning of the fire alarm system to request phone line number assignments for the DACT. The FPE will issue the paperwork necessary to obtain telephone service to the DACT.

D. Acceptance Testing: Contact SCO to request acceptance testing by SNL Fire Alarm Maintenance personnel after commissioning the fire alarm system and completing the "Record of Completion". A fire alarm installer representative shall be present during the SNL acceptance test.

E. Equipment Removal: Remove existing disconnected fire alarm equipment and restore damaged surfaces. Package and deliver unused functional fire alarm equipment to the SNL Fire Alarm Maintenance Supervisor.

F. Coordination with Frame and Dry Wall Installation

1. Install FACP enclosure back box semi-flush inside wall and conceal conduits to FACP in wall prior to completing dry wall installation. Coordinate framing with the installation of the FACP back box.

2. Flush-mount back boxes and J-boxes for annunciators, manual pull stations and notification appliances prior to completing dry wall installation.

G. Coordination with Sprinkler System Installation

1. Sprinkler water flow switches and valve tamper switches are installed by the sprinkler Contractor. Addressable modules will be provided by the fire alarm installer to connect these switches to the SLC.

2. Install raceways and wiring to sprinkler system devices connected to the fire alarm system only after the alarm devices have been installed by the sprinkler contractor.

PART 2 -PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following manufacturers:

1. FACP:

a. Edwards Systems Technology, Inc. (EST)

b. Notifier

2. Initiation Devices and Addressable Modules:

a. Edwards Systems Technology, Inc. (EST)

b. Notifier

3. Notification Appliances and Power Supplies:

a. Wheelock

4. Continuous Linear Heat-Detector System:

a. Protectowire.

2.02 EXISTING FIRE ALARM SYSTEM

A. Compatibility with Existing Equipment: When modifying an existing building fire alarm system, the new components shall operate as an extension of the existing fire alarm system.

2.03 FIRE ALARM CONTROL PANEL

A. Description: Provide an intelligent fire alarm control panel with the internal components required for a fully operational fire alarm detection and evacuation system meeting the requirements of NFPA 72.

B. Manufacturer/Model Number:

1. Edwards Systems Technology, Inc. (EST), Model QS4-12-G-1

2. Notifier, Model NFS-640, PD-NCA 640-character display with SBB-B4 and DR-B4 backbox/door assembly.

C. Transmission to Central Station: Provide a Digital Alarm Communicator Transmitter (DACT) utilizing Ademco Contact ID communication format to automatically transmit alarm, trouble, and supervisory signals to the SNL Central Station.

D. Primary Power: 24 Vdc obtained from 120 Vac service and a power-supply module. Initiating devices and DACT shall be powered by the 24 Vdc source.

1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.

2. Power supply shall have a dedicated 20-amp branch circuit breaker from the nearest power panel.

E. Secondary Power: 24 Vdc supply system with batteries and automatic battery charger and an automatic transfer switch.

1. Batteries: Sealed, valve-regulated, recombinant lead acid.

2. Battery and Charger Capacity: Comply with NFPA 72. The batteries shall be sized to operate the system under the maximum normal load for 24 hours and then be capable of operating the system for 5 minutes in the alarm condition.

F. Surge Protection: Install surge protectors recommended by FACP manufacturer. Install surge protection devices on all system wiring external to the building housing the FACP and internal to the FACP as required for the protection of electronic components.

2.04 MANUAL FIRE ALARM PULL STATIONS

A. Manufacturer/Model Number:

1. EST, Model SIGA-278, double action fire alarm station.

2. Notifier, Model NBG-12LX, dual-action addressable pull station.

B. Surface Mounting Boxes: If surface mounting of pull station is required, provide the following box:

1. EST, Model 276B-RSB, red surface mount box for SIGA-278 series pull station.

2. Notifier, Model SB-10, surface back box for NBG-12LX pull station.

2.05 SMOKE DETECTORS

A. Photoelectric Smoke Detectors:

1. Manufacturer/Model Number:

a. EST, Model SIGA-PS, mounted on standard detector base SIGA-SB4.

b. Notifier, Model FSP-751, mounted on standard detector base B710LP.

2. Detector Isolator Bases: Where required on drawings, provide the following detector isolator base:

a. EST, Model SIGA-IB4.

b. Notifier, Model B224BI.

B. Duct Smoke Detectors:

1. Manufacturer/Model Number:

a. EST, Model SIGA-DH duct smoke detector housing with a Model SIGA-PS photoelectric smoke detector.

b. Notifier, Model FSD-751P.

2. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector for use in exterior locations or a NEMA 3R enclosure sized to contain the detector.

3. Remote Test Station:

   a. EST, Model SIGA-DTS Duct Test Station.

   b. Notifier, Model RTS451KEY with key reset switch.

4. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.

2.06 HEAT DETECTORS

A. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or rate-of-rise of temperature that exceeds 15 deg F per minute, unless otherwise indicated.

   1. EST, Model SIGA-HRS, mounted on standard detector base SIGA-SB4.

   2. Notifier, Model FST-751R, mounted on standard detector base B710LP.

B. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 135 deg F (57 deg C), unless otherwise indicated.

   1. EST, Model SIGA-HFS, mounted on standard detector base SIGA-SB4.

   2. Notifier, Model FST-751, mounted on standard detector base B710LP.

C. Continuous Linear Heat-Detector System: Consists of detector cable and control unit manufactured by Protectowire.

   1. Detector Cable: Rated detection temperature 155 deg F (68 deg C), unless otherwise indicated. Listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short circuit wires at the location of elevated temperature.

   2. Addressable Module: Provide FACP manufacturers standard addressable module to communicate detector status (normal, alarm, or trouble) to the FACP.

2.07 FLAME DETECTORS

A. Provide the FACP manufactures recommended UV/IR detector, or as indicated on drawings.

   1. Addressable Module: Provide FACP manufacturers standard addressable module to communicate detector status (normal, alarm, or trouble) to the FACP.

2.08 NOTIFICATION APPLIANCES

A. Multitone Horn:

1. Wheelock MT-12/24 multitone horn, 24 Vdc.

B. Multitone Horn Strobe:

1. Wheelock MT-241575W-FR multitone strobe, 24 Vdc, 15/75 candela.

2. Wheelock MTWP-2475W-FR weatherproof multitone strobe, 24 Vdc, 75 candelas.

C. Strobe:

1. Wheelock RSS-241575W-FR strobe, 24 Vdc, 15/75 candela, wall mount.

2. Wheelock RSS-24MCW-FR multi-candela strobe, 24 Vdc, wall mount.

D. Surface Mounting Boxes: If surface mounting of NAC appliances is required, provide the following box:

1. Wheelock SHBB surface mount back box for Wheelock RSS series strobes.

2. Wheelock IOB-R surface mount back box for Wheelock MT series multitone appliances.

E. Synchronizing Module:

1. Wheelock SM-24-R.

2. Wheelock DSM-24-R.

2.09 NOTIFICATION APPLIANCE POWER SUPPLY PANELS

A. NAC Power Supply: Wheelock PowerPath PS-12/24-8 power limited 8-ampere power supply/charger with batteries to provide a secondary backup power supply.

B. Batteries: Power-Sonic PS-12120 (or equal) 12 Vdc, 12AH sealed lead-acid batteries (two required).

2.10 ALARM TERMINAL CABINET

A. Fire Alarm Terminal Cabinet: NEMA 1 telephone-type enclosure with hinged door, latch handle, painted red, sized as indicated on drawings.

2.11 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate.

1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.

2. Wall-Mounted Units: Flush mounted, unless otherwise indicated.

3. Rating: 120 Vac.

B. Material and Finish: Match door hardware.

2.12 REMOTE ANNUNCIATOR

A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing.

B. Manufacturer/Model Number:

1. EST, Model QS4-CPU-1.

2. Notifier, Model LCD-80TM, 80 character terminal mode.

C. Flush-Mounted Boxes: If flush mounting of annunciator is required, provide the following box:

1. EST, Model QSA-1-F, flush remote annunciator cabinet with space for one SL30 display.

2. Notifier, Model ABF-1D, semi-flush mount backbox for one LCD-80TM annunciator.

D. Surface-Mounting Boxes: If surface mounting of annunciator is required, provide the following box:

1. EST, Model QSA-1-S, surface remote annunciator cabinet with space for one SL30 display.

2. Notifier, Model ABS-1T, deep surface-mount box for one LCD-80TM annunciator.

2.13 ADDRESSABLE MODULES

A. Description: Addressable modules shall be compatible with the FACP.

B. Monitor Modules: Provide addressable modules to connect supervised IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to a FACP Signal Line Circuit.

C. Control and Relay Modules: Capable of providing a direct signal to operate fire alarm system equipment and other building system components during an alarm signal as indicated on the fire alarm system input/output matrix for fire alarm system operation.

D. Isolator Modules: Isolator modules compatible with the FACP provided where indicated on the drawings.

2.14 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Functional Performance: The DACT shall be an integral part of the FACP that receives an alarm, supervisory, or trouble signal from the FACP, and automatically captures one or two telephone lines and dials a preset number Sandia's Central Station DACR(s). When contact is made with the DACR(s), the signal is transmitted using the Ademco Contact ID communication format. The DACT shall support independent zone/point reporting when used in the Contact ID format. The unit supervises two telephone lines. If service on either line is interrupted, the unit initiates a local trouble signal and transmits a signal indicating loss of telephone line to the Central Station over the remaining line. When telephone service is restored, unit automatically reports that event to the Central Station. If service is lost on both telephone lines, the local trouble signal is initiated.

B. Primary/Secondary Power: The FACP will provide primary and secondary power for the DACT.

C. Self-Test: Conducted automatically every 24 hours with report transmitted to Sandia Central Station.

2.15 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B Signaling Line Circuits: SLC cables from FACP to and between addressable devices/modules shall be 2 twisted #16 AWG solid copper, unshielded, color-coded red and black, Belden 9572 or equivalent.

C. Initiation Device Circuits:

1. IDC wiring from addressable modules to N.O. and N.C. contacts shall be #14 AWG THWN solid copper conductor, color-coded red and black.

2. IDC wiring from addressable modules to conventional zones and detection devices shall be 2 twisted #16 AWG solid copper, unshielded, color-coded red and black, Belden 9572 or equivalent.

D. Notification Appliance Circuits: NAC cables shall be 2 twisted #14 AWG solid copper, unshielded, color-coded red and black, Belden 9580 or equivalent.

E. DACT Telephone Circuit: 8-conductor CAT5 telephone cable.

F. Control Circuits: Control circuits shall be #12 AWG THWN solid copper, color-coded red and black.

G. AC Power Circuits: 120 Vac circuits shall be #12 AWG THWN solid copper.

H. Annunciator Circuits: Wiring from FACP to annunciator panels shall be the FACP manufacturers recommended cabling.

I. FACP Network Circuits: Wiring between multiple networked FACPs shall be the FACP manufacturers recommended cabling.

PART 3 -EXECUTION

3.01 GENERAL REQUIREMENTS

A. The Contractor shall install, program, and test all new fire alarm equipment identified in contract and revise existing equipment where noted.

B. The Contractor shall furnish and install all required conduit and all associated hardware, and shall install (pull), terminate, and test all cable for a complete operational fire alarm system. Refer to Section 16001 “Electrical Work” for further requirements for raceway installations.

C. Mount initiation devices and notification appliances at the elevations and locations specified in NFPA 72 and the manufacturers’ specifications. Initiating devices shall be located where they are accessible for maintenance and testing.

D. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.

1. Expand, modify, and supplement the existing detection, notification, and control fire alarm system components as necessary to extend the existing control and monitoring functions to the new fire alarm equipment being installed.

2. New fire alarm equipment components shall be capable of merging with the existing fire alarm system configuration without degrading the performance of either system.

E. Firestopping: Firestopping shall be provided where conduit penetrates rated firewalls and all floors.

3.02 EQUIPMENT INSTALLATION

A. Fire Alarm Control Panel (FACP):

1. Primary power, 120 Vac, for the panel shall be from a 20 amp dedicated branch circuit at the nearest power panel. The electrical breaker of the branch circuit shall be identified by a red painted dot adjacent to each breaker.

2. Install ¾" EMT from the FACP to the IDR room with telephone premises cable for DACT communication to the Sandia Central Station.

3. Location: Mount the FACP at a location near the building entrance, or where indicated on drawings, that is readily visible to emergency responders.

4. Mounting Height: Semi-flush mount FACP, unless indicated otherwise on drawings, with top of cabinet not more than 72 inches above the finished floor. Surface-mount FACP on masonry and brick surfaces.

5. Install a pull box or wireway in the ceiling above the FACP in a concealed accessible location to minimize conduit penetrations into the FACP enclosure. Refer to FA5003STD for details.

B. Manual Fire Alarm Pull Stations:

1. Install pull station semiflush in recessed back box unless otherwise indicated.

2. Mount manual pull station 4'-0" above finished floor in highly visible accessible locations on exit egress routes. Install pull station on the latch side of egress door immediately adjacent to the door.

C. Smoke Detectors:

1. Ceiling-Mounted Smoke Detectors:

   a. Install not less than 4 inches from a sidewall to the near edge.

   b. For exposed solid-joist and solid beam construction exceeding 12 inches in depth, install detectors inside each beam pocket.

   c. For open-joist construction exceeding 12 inches in depth, mount detectors on the ceiling. For open-joists 12 inches or less in depth, mount detectors on the bottom of the joists.

   d. Smooth ceiling spacing shall not exceed the rating of the detector.

2. Wall-Mounted Smoke Detectors: Install at least 4 inches, but not more than 12 inches, below ceiling.

3. HVAC: Locate smoke detectors not closer than 3 feet from air-supply diffuser or return-air opening.

4. Do not install smoke detectors until after cleanup of all construction trades is complete and final. Do not remove dust covers provided with detector until the time of the final acceptance testing of the fire alarm system.

D. Heat Detectors:

1. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined per NFPA 72 requirements.

2. Install not less than 4 inches from a side wall to the near edge. For exposed solid-joist construction, mount detectors on the bottom of joists. Smooth ceiling spacing shall not exceed the rating of the detector or the manufacturers specifications.

3. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.

E. Duct Smoke Detectors:

1. Locate and install duct detector in compliance with NFPA 72 and NFPA 90A requirements. Install sampling tubes so they extend the full width of the duct with sampling holes facing into the air flow.

2. Install duct detector, duct housing and sampling tube in strict conformance with the manufacturer's installation instructions.

3. Install duct detector housing in duct where it can be accessed for maintenance of smoke detector. When a ladder cannot be used to access duct detector from

finished floor, provide access door or platform where a maintenance worker can reach the duct detector. The platform shall support a minimum of 300 pounds.

4. Install directional labels pointing toward duct detectors installed in equipment room locations not readily visible by personnel from the finished floor.

5. Provide a weatherproof enclosure to contain duct detectors installed in outdoor locations (unless the detector is rated for exterior installation).

F. Remote Test Station: Install Remote Test Station (RTS) for each duct smoke detector. Locate and group the RTSs in the nearest equipment room or electrical closet with a label on each RTS indicating the duct smoke detector it activates.

G. Addressable Modules:

1. Install addressable modules as required to monitor each detection devices with N.O. and N.C. contacts for connection to the SLC.

2. Do not install the SLC outside of the building housing the FACP unless approved by the SNL FPE. For detection devices exterior to the building (e.g., PIV tamper switches, detection devices in sheds) or IDCs in small connected buildings (<= 4 conventional zones), install addressable modules inside the building housing the FACP to connect the exterior devices and zones.

3. Install addressable modules as required to control ancillary equipment controlled by the FACP and to activate the NAC power supplies.

H. Isolator Modules: Install isolator modules on SLC every 20-25 detector/modules or when the SLC enters a new floor or section in the building.

I. Notification Appliances:

1. Locations: Install multitone horn appliances at locations to comply with NFPA 72 requirements for audible levels. Install strobes in common areas (e.g., restrooms, conference rooms, hallways), and open areas with 10 or more occupants. Install weatherproof multitone/strobe on the exterior of the building at the main entrance readily visible to emergency responders.

2. Mounting Heights: Surface-mount notification appliances on the wall between 80 and 96 inches above finished floor, and not less than of 6 inches below the ceiling.

3. Settings: Set multitone horn dipswitches for the bell tone, “HI” settings.

J. NAC Power Supply:

1. Mounting Height: Surface mount with top of power supply not more than 72 inches above the finished floor.

2. Settings:

a. 24 Vdc output.

b. Steady output.

c. IN>OUT SYNC Mode, or WHEELOCK SYNC Mode.

K. FATC: Surface mount, with top of enclosure not more than 72 inches above the finished floor.

L. Annunciator:

1. Install annunciator semiflush in recessed back box unless otherwise indicated.

2. Mounting: Install with top of annunciator not more than 60 inches above the finished floor.

3.03 CONDUIT AND RACEWAYS

A. Conduit and raceways shall be installed in accordance with the National Electric Code (NEC) and Division 16, Section 16001 “Electrical Work”.

B. The minimum allowable conduit size shall be ¾ inch for fire alarm circuits.

C. Conduits shall not enter the FACP, or any other remotely mounted annunciator or NAC power supply, except where permitted by the equipment manufacturer.

D. Conduits used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.

E. Paint fire alarm system junction box covers red.

3.04 WIRING INSTALLATION

A. Wiring Method:

1. Install wiring in metal raceway according to Division 16 Section 16001 "Electrical Work."

2. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

3. Terminations: All field wiring shall terminate on terminal blocks in FACP, fire alarm terminal cabinets, and at field devices and appliances. Splices are not permitted in field wiring except as specifically allowed. Connections using wire nuts are not permitted.

4. Signaling Line Circuits: SLC and IDC conductors shall not be smaller than 16 AWG. Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.

5. Notification Appliance Circuits: NAC conductors shall not be smaller than 14 AWG.

B. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

C. Cable Taps: Cable taps (T-taps) are not permitted on the SLC and NAC circuits.

D. Color-Coding:

1. Signal Line Circuit (SLC): Red (+), Black (-)

2. Initiating Device Circuit (IDC): Red (+), Black (-)

3. Notification Appliance Circuit (NAC): Red (+), Black (-)

4. Control Circuit: Red (+), Black (-)

5. 120 VAC: Hot (Phase A – Black, Phase B – Red, Phase C – Blue), Neutral – White, and Ground – Green.

E. For Class A circuits provide separate conduits for outgoing and return cables per the requirements in NFPA 72.

F. Notification Appliances:

1. Synchronize strobes per the requirements in NFPA 72 and the manufacturers requirements.

2. Do not exceed 80% of the permissible NAC amperage load during initial installation to allow future appliance additions to the NAC.

3.05 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 16, Section 16001, “Electrical Work."

B. Identify dedicated fire alarm circuit breakers with a red paint dot and label "FIRE ALARM."

C. Install nameplates on outside door of Fire Alarm Terminal Cabinets and Notification Appliance Power Supply Panels in accordance with Standard Drawing E-0006STD.

D. Label conductors to indicate SLC loop number and NAC zone number. Refer to Division 16, Section 16001, “Electrical Work” and Standard Drawing FA7001STD for the approved methods.

E. Paint J-box and pull box covers red to identify as fire alarm equipment. Label the covers of enclosures containing exposed 120 VAC terminations “120 VAC INSIDE”.

F. Conduit Labeling

1. Brown ¾” tape (Scotch #351) at each joint and termination for conduits containing initiating and notification circuits.

2. Install white ¾” tape (Scotch #351) adjacent to brown tape to identify communication conduit from DGP to IDR.

3. Install blue ¾” tape (Scotch #351) adjacent to brown tape for conduits containing fire alarm control circuits.

3.06 GROUNDING

A. Ground the FACP and associated circuits; comply with IEEE 1100. Provide grounding for the FACP and NAC power supplies as required by NFPA 70 and the manufacturer’s recommendations.

3.07 FIELD QUALITY CONTROL

A. The fire alarm system installer shall perform the following field tests and inspections and prepare test reports:

1. Before requesting final approval of the installation, complete the Record of Completion shown in NFPA 72.

2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters.

3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.

4. Testing: Follow procedure and record results complying with requirements in NFPA 72.

   a. Detectors that are outside their marked sensitivity range shall be replaced.

5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in NFPA 72 Appendix A.

6. NAC Decibel Level Test: Perform sound tests to determine decibel levels in all areas of the building with all NAC appliances operating on primary power. Note decibel levels on floor plans and deliver to SNL FPE prior to system acceptance test. Install additional NAC appliances in areas with deficient decibel levels. Refer to Part 1.07I in this Section for the minimum levels required for each Occupancy.

3.08 CLEANING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and marred finishes to match original finish.

3.09 WARRANTY

A. All equipment, materials and installation shall be warranted by the Contractor/Manufacturer during construction and for a period of one year after the final acceptance testing of the fire alarm system installation.

PART 4 - CADD SOFTWARE GUIDELINES FOR DRAWING SUBMITTALS

4.01 MICROSTATION J

A. SNL Facilities maintains MicroStation J for Windows/NT, release 05.07.01.14 (vector) as its standard CADD software. When future upgrades occur, it is required that the Fire Alarm Designer utilize the new workspace and MicroStation software. To maximize efficiency, SNL will provide a custom MicroStation J workspace environment, which includes toolboxes, tool frames, macros, MicroStation Development Language (MDL) application, user commands, help routines, and menu bars to help in the production of facilities CADD files. Refer to the Facilities CADD Standards Manual for further instructions.

4.02 AUTOCAD

A. AutoCAD 2000 or later version may be used in lieu of MicroStation J under the condition that the following requirements will be met:

1. The translated MicroStation architectural floor plan must be referenced into AutoCAD model. Each AutoCAD model will show the Fire Alarm Design for a given floor.

2. The Reference SNL standard border files must be referenced into all project sheets (layout tabs). Each layout tab will contain border, keyed notes, general notes, details, and title block information. Each layout tab will be identified (labeled) with correct SNL plotted file name.

3. All data, designs, records, graphics and supporting tools generated during project creation shall be included in the deliverable file package.

4. Any fonts, line styles, or blocks used to generate these files that are not AutoCAD 2000 standard must be submitted as part of the deliverable package.

5. All layers will follow CAD Layer Guidelines, 2nd edition or newer, established by the American Institute of Architects.

6. A table, listing all line, text, and block information will be created within each design file just outside of the plotted area. Information to include: layer names, color, pen width association, line style, description, text size, block names and identification of frozen layers.

7 When design is completed, all deliverables must be in MicroStation J format submit all shop drawings in electronic media to the FPE. Any assistance or questions should be directed to and from the SNL CADD Coordinator.

PART 5 -ATTACHMENTS

5.01 Attachment A - Signage for Fire Alarm Impairment

END OF SECTION 13852

ATTENTION

IN CASE OF FIRE
CALL 911

FIRE ALARM SYSTEM IS NOT OPERATIONAL AS OF:

DATE: _____ **TIME:** _____